

# Test Report

Verified code: 669556

Report No.: E20240822625802-3

Customer: Faurecia Clarion Electronics (Xiamen) Co., Ltd.

Address: 6F, No.40, Guanri Road, Software Park Stage II, Xiamen, China

Sample Name: CAR AUDIO

Sample Model: P2401

Receive Sample Date: Sep.03,2024

Test Date: Sep.14,2024 ~ Nov.13,2024

Reference Document: 47 CFR Part 15 Subpart C Intentional Radiators

Test Result: Pass

Prepared by: Huang Lifang  
Huang Lifang

Reviewed by: Wu Haoting  
Wu Haoting

Approved by: Xiao Liang  
Xiao Liang



GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-11-15

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REPORT ISSUED HISTORY

| Report Version | Report No.        | Description    | Compile Date |
|----------------|-------------------|----------------|--------------|
| 1.0            | E20240822625802-3 | Original Issue | 2024-11-13   |

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**1. TEST RESULT SUMMARY**

| <b>47 CFR Part 15 Subpart C 15.247, ANSI C63.10-2020<br/>KDB 558074 D01 15.247 measurement guidance v05r02</b> |                                               |                               |               |
|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------|---------------|
| <b>Standard</b>                                                                                                | <b>Item</b>                                   | <b>Limit / Severity</b>       | <b>Result</b> |
| FCC 47 CFR Part 15<br>Subpart C (15.247)                                                                       | Antenna Requirement                           | Section 15.203                | PASS          |
|                                                                                                                | 20dB Bandwidth                                | Section 15.247(a)(1)          | PASS          |
|                                                                                                                | Carrier Frequencies Separated                 | Section 15.247(a)(1)          | PASS          |
|                                                                                                                | Hopping Channel Number                        | Section 15.247(a)(1)(iii)     | PASS          |
|                                                                                                                | Dwell Time                                    | Section 15.247(a)(1)(iii)     | PASS          |
|                                                                                                                | Maximum Peak Output Power                     | Section 15.247(b)(1)          | PASS          |
|                                                                                                                | Conducted band edges and<br>Spurious Emission | Section 15.209<br>&15.247(d)  | PASS          |
|                                                                                                                | Radiated Spurious Emission                    | Section 15.209<br>&15.247(d)  | PASS          |
|                                                                                                                | Restricted bands of operation                 | Section 15.247 (d)<br>&15.205 | PASS          |

Note: The EUT antenna is Chip antenna. Max Antenna gain is 3.2dBi .Which accordance 15.203.is considered sufficient to comply with the provisions of this section.

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## 2. GENERAL DESCRIPTION OF EUT

### 2.1 APPLICANT

Name: Faurecia Clarion Electronics (Xiamen) Co., Ltd.  
Address: 6F,No.40,Guanri Road, Software Park Stage II, Xiamen, China

### 2.2 MANUFACTURER

Name: Faurecia Clarion Electronics Co., Ltd.  
Address: 7-2 Shintoshin, Chuo-ku, Saitama-shi, Saitama, 330-0081, Japan

### 2.3 FACTORY

Name 1: Clarion Asia (Thailand) Co., Ltd.  
Address 1: 500/39 Moo3, Hemaraj Eastern Seaboard Industrial Estate 1, Tambol Tasith, Amphur Pluakdaeng Rayong 21140,Thailand  
Name 2: PT OPTIMA ELEKTRONIK MANUFAKTUR  
Address 2: MANUFAKTUR Kawasan Industri JABABEKA II, JL. Industri Selatan 5 Blok FF1L, Kel. Pasirsari Cikarang Selatan, Kab. Bekasi, Prov. Jawa Barat

### 2.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: CAR AUDIO  
Model No.: P2401  
Adding Model: /  
Model difference description: /  
Trade Name: Clarion  
FCC ID: WY2P2401  
Power supply: DC 13.2V,15A  
Frequency Range: 2402MHz~2480MHz  
Transmit Power: GFSK: -1.78dBm  
 $\pi/4$ -DQPSK:-0.67dBm  
8DPSK:-0.53dBm  
Type of Modulation: GFSK for 1Mbps,  $\pi/4$ -DQPSK for 2Mbps,8DPSK for 3Mbps

Antenna Specification: 3.2dBi

Temperature Range: -30℃~+70℃

Hardware Version: 2.0.0

Software Version: 02.00.00

Sample No: E20240822625802-0001, E20240822625802-0006

Note:

- 1.The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.
2. The product model has two structures are consistent with schematic, block diagram, PCB layout, Hardware version, Software version, HSD circuit and HSD socket, Offline navigation, Memory and internal structure. The only difference is whether the DAB board is installed. The differences are not affecting the RF performance.

For specific differences please refer to the following table:

| Function                                                                                                                | Product name: CAR AUDIO |                       |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------|
|                                                                                                                         | Model name: P2401       |                       |
|                                                                                                                         | Minimum Configuration   | Maximum Configuration |
| BT (5.0)                                                                                                                | √                       | √                     |
| HSD circuit and HSD socket                                                                                              | √                       | √                     |
| Offline navigation                                                                                                      | √                       | √                     |
| Memory                                                                                                                  | √                       | √                     |
| DAB                                                                                                                     | ×                       | √                     |
| Note: The two products have the same wireless IC, radiation circuit, power circuit and other circuits, with same shell. |                         |                       |

3. The maximum configuration of the model was tested and recorded in this report.

## 2.5 TEST OPERATION MODE

| Mode No. | Description of the modes                   |
|----------|--------------------------------------------|
| 1        | Bluetooth(BT) fixed frequency transmitting |

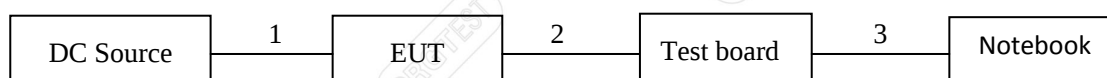
## 2.6 LOCAL SUPPORTIVE

| Name of equipment | Manufacturer | Model        | Serial number | Note |
|-------------------|--------------|--------------|---------------|------|
| DC Source         | LW           | PS-305DM     | 180704515     | /    |
| Notebook          | DELL         | Latitude3490 | 2095LR2       | /    |
| Test board        | /            | /            | /             | /    |

| No. | Cable Type      | Qty. | Shielded Type | Ferrite Core(Qty.) | Length |
|-----|-----------------|------|---------------|--------------------|--------|
| 1   | DC cable        | 1    | No            | 0                  | 1.0m   |
| 2   | Serial cable    | 1    | No            | 0                  | 0.2m   |
| 3   | USB-Micro cable | 1    | No            | 0                  | 0.5m   |

Note: <sup>(1)</sup> The notebook is just used to produce fixed frequency transmitting.

## 2.7 CONFIGURATION OF SYSTEM UNDER TEST



### Test software:

| Software version | Test level |
|------------------|------------|
| Teraterm         | Default    |

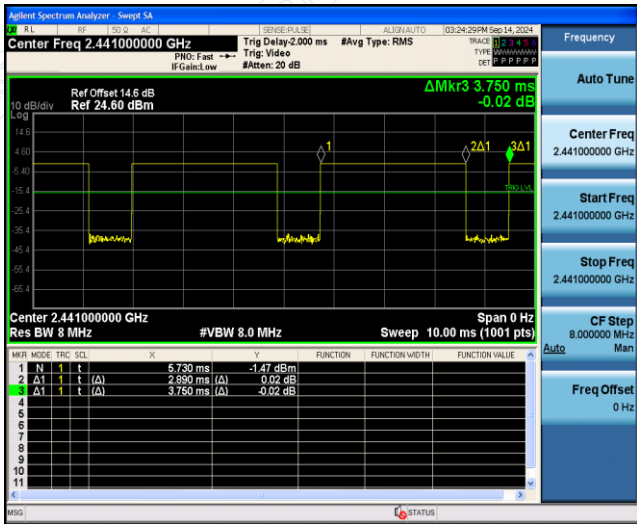
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2.8 DUTY CYCLE

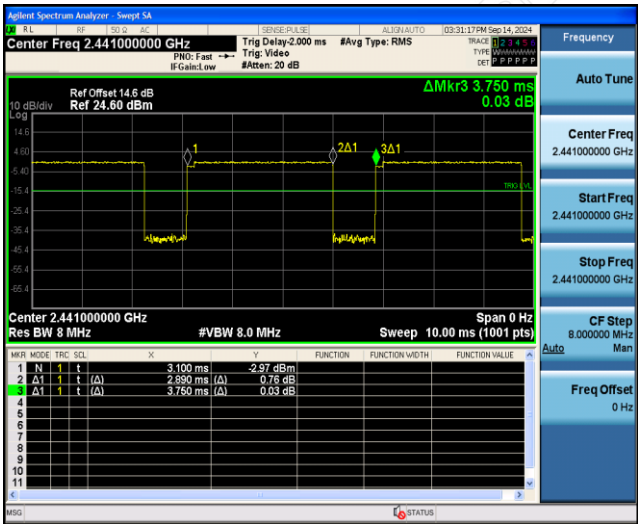
|                          |                       |              |            |
|--------------------------|-----------------------|--------------|------------|
| EUT Name                 | CAR AUDIO             | Model        | P2401      |
| Environmental Conditions | 24.9°C/49%RH/101.0kPa | Test Voltage | DC 13.2V   |
| Tested By                | Qin Tingting          | Tested Date  | 2024-09-14 |

| Test Mode | Antenna | Frequency [MHz] | ON Time [ms] | Period [ms] | DC [%] | T [s]   |
|-----------|---------|-----------------|--------------|-------------|--------|---------|
| DH5       | Ant1    | 2441            | 2.89         | 3.75        | 77.07  | 0.00289 |
| 2DH5      | Ant1    | 2441            | 2.89         | 3.75        | 77.07  | 0.00289 |
| 3DH5      | Ant1    | 2441            | 2.90         | 3.75        | 77.33  | 0.00290 |

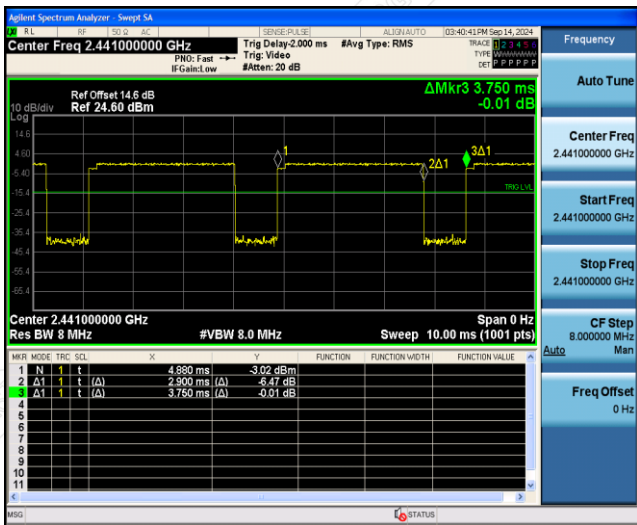
DH5\_2441MHz



2DH5\_2441MHz



3DH5\_2441MHz



### 3. LABORATORY AND ACCREDITATIONS

#### 3.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add : No.1301 Guangang Road Xinlan Community, Guanlan Street, Longhua District  
Shenzhen, 518110, People's Republic of China

P.C. : 518110

Tel : 0755-61180008

Fax : 0755-61180008

#### 3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

**USA** A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

**Canada** ISED (Company Number: 24897, CAB identifier:CN0069)

**USA** FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,  
<http://www.grgtest.com>

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#### 4. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| Measurement       |            | Frequency      | Uncertainty         |
|-------------------|------------|----------------|---------------------|
| Radiated Emission | X          | 9kHz~30MHz     | 4.4dB <sup>1)</sup> |
|                   | Y          | 9kHz~30MHz     | 4.4dB <sup>1)</sup> |
|                   | Z          | 9kHz~30MHz     | 4.4dB <sup>1)</sup> |
|                   | Horizontal | 30MHz~200MHz   | 4.6dB <sup>1)</sup> |
|                   |            | 200MHz~1000MHz | 4.8dB <sup>1)</sup> |
|                   |            | 1GHz~18GHz     | 5.0dB <sup>1)</sup> |
|                   |            | 18GHz~26.5GHz  | 5.2dB <sup>1)</sup> |
|                   | Vertical   | 30MHz~200MHz   | 4.7dB <sup>1)</sup> |
|                   |            | 200MHz~1000MHz | 4.7dB <sup>1)</sup> |
|                   |            | 1GHz~18GHz     | 5.1dB <sup>1)</sup> |
|                   |            | 18GHz~26.5GHz  | 5.4dB <sup>1)</sup> |

| Measurement                      | Uncertainty          |
|----------------------------------|----------------------|
| RF frequency                     | $6.0 \times 10^{-6}$ |
| RF power conducted               | 0.80dB               |
| Power spectral density conducted | 0.80dB               |
| Occupied channel bandwidth       | 0.40dB               |
| Unwanted emission, conducted     | 0.70dB               |
| Humidity                         | 6.0%                 |
| Temperature                      | 2.0°C                |

Note:

<sup>1)</sup> This uncertainty represents an expanded uncertainty expressed at approximately the 95%.  
This uncertainty represents an expanded uncertainty factor of  $k=2$ .

## 5. LIST OF USED TEST EQUIPMENT AT GRGT

| Name of Equipment                                                                                                                                                       | Manufacturer       | Model          | Serial Number | Calibration Due |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|---------------|-----------------|
| <b>Radiated Spurious Emission&amp;Restricted bands of operation</b>                                                                                                     |                    |                |               |                 |
| Test Receiver                                                                                                                                                           | R&S                | ESR26          | 101758        | 2025-09-10      |
| Spectrum Analyzer                                                                                                                                                       | R&S                | FSV3044        | 101184        | 2025-07-19      |
| Bi-log Antenna                                                                                                                                                          | Schwarzbeck        | VULB9160       | VULB9160-3402 | 2025-09-24      |
| Loop Antenna                                                                                                                                                            | Schwarzbeck        | FMZB 1513-60   | 1513-60-56    | 2025-05-07      |
| Preamplifier                                                                                                                                                            | SHIRONG ELECTRONIC | DLNA-30M1G-G41 | 20200928002   | 2024-10-24      |
| Horn Antenna                                                                                                                                                            | Schwarzbeck        | BBHA9120D      | 02143         | 2025-09-07      |
| Board-Band Horn Antenna                                                                                                                                                 | Schwarzbeck        | BBHA 9170      | BBHA 9170-497 | 2025-08-30      |
| Amplifier                                                                                                                                                               | Tonscend           | TAP01018048    | AP20E8060075  | 2025-03-01      |
| Amplifier                                                                                                                                                               | Tonscend           | TAP184050      | AP20E806071   | 2025-03-01      |
| Amplifier                                                                                                                                                               | SHIRONG ELECTRONIC | DLNA-1G18G-G40 | 20200928005   | 2025-07-19      |
| Test S/W                                                                                                                                                                | Tonscend           | JS32-RE/5.0.0  |               |                 |
| <b>20dB Bandwidth&amp; Carrier Frequencies Separated &amp; Hopping Channel Number &amp; Dwell Time &amp;Conducted band edges and Spurious Emission &amp; Duty Cycle</b> |                    |                |               |                 |
| Spectrum Analyzer                                                                                                                                                       | Agilent            | N9020A         | MY50510140    | 2025-08-22      |
| Pulse power sensor                                                                                                                                                      | Tonscend           | u2021A         | I00641        | 2025-06-06      |
| Simultaneous sampling DAQ                                                                                                                                               | Tonscend           | JS0806-2       | 186060020     | 2025-06-06      |
| BT/WIFI System                                                                                                                                                          | Tonscend           | JS1120-3       |               |                 |
| <b>Maximum Peak Output Power</b>                                                                                                                                        |                    |                |               |                 |
| Pulse power sensor                                                                                                                                                      | Anritsu            | MA2411B        | 1126150       | 2025-01-11      |
| Power meter                                                                                                                                                             | Anritsu            | ML2495A        | 1204003       | 2025-01-11      |

Note: The calibration interval of the above test instruments is 12 months.

## 6. E.U.T. TEST CONDITIONS

Type of antenna:

Chip

Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

| Frequency range over which device operates | Number of frequencies | Location in the range of operation         |
|--------------------------------------------|-----------------------|--------------------------------------------|
| 1 MHz or less                              | 1                     | Middle                                     |
| 1 to 10 MHz                                | 2                     | 1 near top and 1 near bottom               |
| More than 10 MHz                           | 3                     | 1 near top 1 near middle and 1 near bottom |

EUT channels and frequencies list:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 0       | 2402            | 14      | 2416            | 28      | 2430            |
| 1       | 2403            | 15      | 2417            | 29      | 2431            |
| 2       | 2404            | 16      | 2418            | 30      | 2432            |
| 3       | 2405            | 17      | 2419            | 31      | 2433            |
| 4       | 2406            | 18      | 2420            | 32      | 2434            |
| 5       | 2407            | 19      | 2421            | 33      | 2435            |
| 6       | 2408            | 20      | 2422            | 34      | 2436            |
| 7       | 2409            | 21      | 2423            | 35      | 2437            |
| 8       | 2410            | 22      | 2424            | 36      | 2438            |
| 9       | 2411            | 23      | 2425            | 37      | 2439            |
| 10      | 2412            | 24      | 2426            | 38      | 2440            |
| 11      | 2413            | 25      | 2427            | 39      | 2441            |
| 12      | 2414            | 26      | 2428            | 40      | 2442            |
| 13      | 2415            | 27      | 2429            | 41      | 2443            |

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|---------|-----------------|
| 42      | 2444            | 55      | 2457            | 68      | 2470            |
| 43      | 2445            | 56      | 2458            | 69      | 2471            |
| 44      | 2446            | 57      | 2459            | 70      | 2472            |
| 45      | 2447            | 58      | 2460            | 71      | 2473            |
| 46      | 2448            | 59      | 2461            | 72      | 2474            |
| 47      | 2449            | 60      | 2462            | 73      | 2475            |
| 48      | 2450            | 61      | 2463            | 74      | 2476            |
| 49      | 2451            | 62      | 2464            | 75      | 2477            |
| 50      | 2452            | 63      | 2465            | 76      | 2478            |
| 51      | 2453            | 64      | 2466            | 77      | 2479            |
| 52      | 2454            | 65      | 2467            | 78      | 2480            |
| 53      | 2455            | 66      | 2468            |         |                 |
| 54      | 2456            | 67      | 2469            |         |                 |

Test frequency is the lowest channel: 0 frequency(2402MHz), middle channel: 39 frequency (2441MHz) and highest channel: 78 frequency(2480MHz)

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## 7. 20dB BANDWIDTH

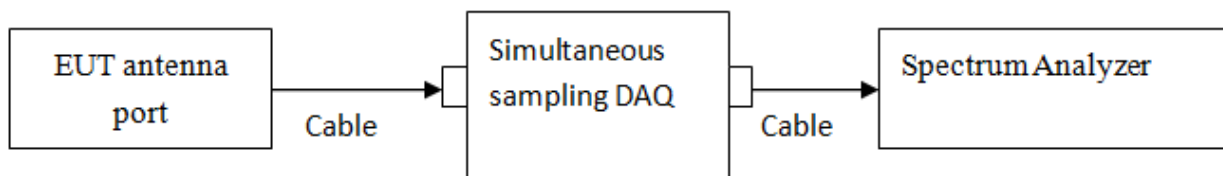
### 7.1 LIMITS

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 7.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT, and then connect a low loss RF cable from antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW=30 kHz, VBW=100 kHz, Span=3MHz, Sweep = auto. Allow the trace to stabilize, record 20dB bandwidth value
- 3) Repeat until all the test channels are investigated.

### 7.3 TEST SETUP



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7.4 TEST RESULTS

Environment: 24.9°C/49%RH/101.0kPa  
Tested By:Qin Tingting

Voltage:DC 13.2V  
Date: 2024-09-14

| Test Mode | Antenna | Channel | Frequency [MHz] | 20 dB Bandwidth [MHz] |
|-----------|---------|---------|-----------------|-----------------------|
| DH5       | Ant1    | Lowest  | 2402            | 0.948                 |
|           |         | Middle  | 2441            | 0.996                 |
|           |         | Highest | 2480            | 0.981                 |
| 2DH5      | Ant1    | Lowest  | 2402            | 1.362                 |
|           |         | Middle  | 2441            | 1.365                 |
|           |         | Highest | 2480            | 1.368                 |
| 3DH5      | Ant1    | Lowest  | 2402            | 1.356                 |
|           |         | Middle  | 2441            | 1.320                 |
|           |         | Highest | 2480            | 1.323                 |

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Test Graphs

DH5  
Lowest Channel



Middle Channel



Highest Channel



2DH5

Lowest Channel



Middle Channel



Highest Channel



3DH5  
Lowest Channel



Middle Channel



Agilent Spectrum Analyzer - Sweep SA

RL RF SQ Q AC [SENSE] PLUSE [ALIGN] AUTO [03:42:36 PM Sep 14, 2024]

Center Freq 2.480000000 GHz #Avg Type: RMS

PNO: Wide IF Gain: Low Trig: Free Run #Atten: 30 dB

TRACE 1 2 3 4 5 6  
TYPE [MAWAWAW] DET [PPPPPP]

Frequency

Auto Tune

Center Freq 2.480000000 GHz

Start Freq 2.478500000 GHz

Stop Freq 2.481500000 GHz

CF Step 300.000 kHz

Man

Ref Offset 14.6 dB  
Ref 20.00 dBm

$\Delta$ Mkr3 1.323 MHz  
-0.63 dB

10 dB/div  
Log

Center 2.480000 GHz Span 3.000 MHz  
#Res BW 30 kHz #VBW 100 kHz Sweep 3.200 ms (1001 pts)

| MkR | MODE       | TRC | SCL | X                      | Y          | FUNCTION | FUNCTION WIDTH | FUNCTION VALUE |
|-----|------------|-----|-----|------------------------|------------|----------|----------------|----------------|
| 1   | N          | 1   | f   | 2.479 349 GHz          | -24.59 dBm |          |                |                |
| 2   | N          | 1   | f   | 2.480 169 GHz          | -4.47 dBm  |          |                |                |
| 3   | $\Delta$ 1 | 1   | f   | 1.323 MHz ( $\Delta$ ) | -0.63 dB   |          |                |                |
| 4   |            |     |     |                        |            |          |                |                |
| 5   |            |     |     |                        |            |          |                |                |
| 6   |            |     |     |                        |            |          |                |                |
| 7   |            |     |     |                        |            |          |                |                |
| 8   |            |     |     |                        |            |          |                |                |
| 9   |            |     |     |                        |            |          |                |                |
| 10  |            |     |     |                        |            |          |                |                |
| 11  |            |     |     |                        |            |          |                |                |

Auto

Freq Offset 0 Hz

MSO STATUS

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## 8. CARRIER FREQUENCIES SEPARATED

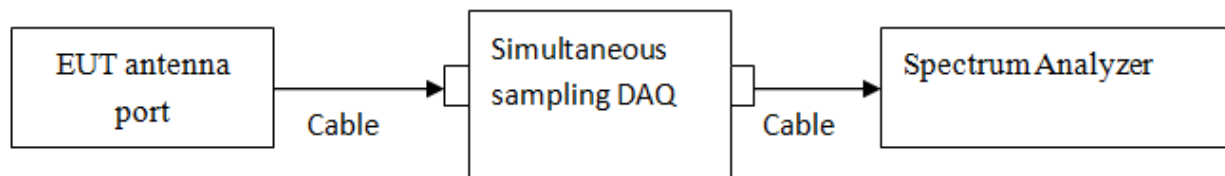
### 8.1 LIMITS

1) Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 8.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set center frequency of spectrum analyzer = middle of hopping channel.
- 3) Set the spectrum analyzer as RBW=300kHz, VBW=300kHz, Adjust Span to 2MHz, Sweep = auto
- 4) Use the marker-delta function to mark hopping channel carrier frequencies and record the channel separation.

### 8.3 TEST SETUP



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8.4 TEST RESULTS

Environment: 24.7°C/52%RH/101.0kPa  
Tested By:Qin Tingting

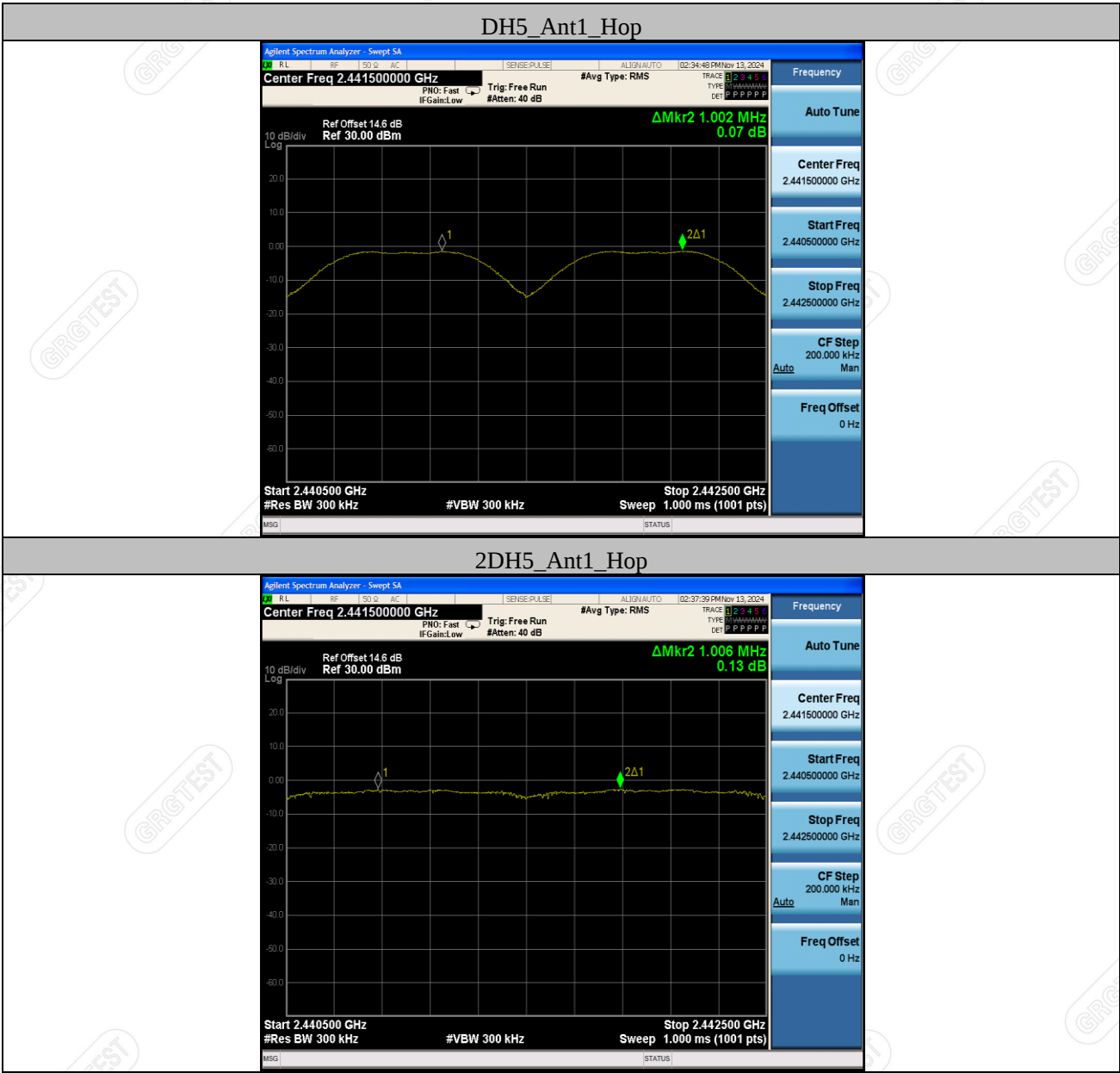
Voltage:DC 13.2V  
Date: 2024-11-13

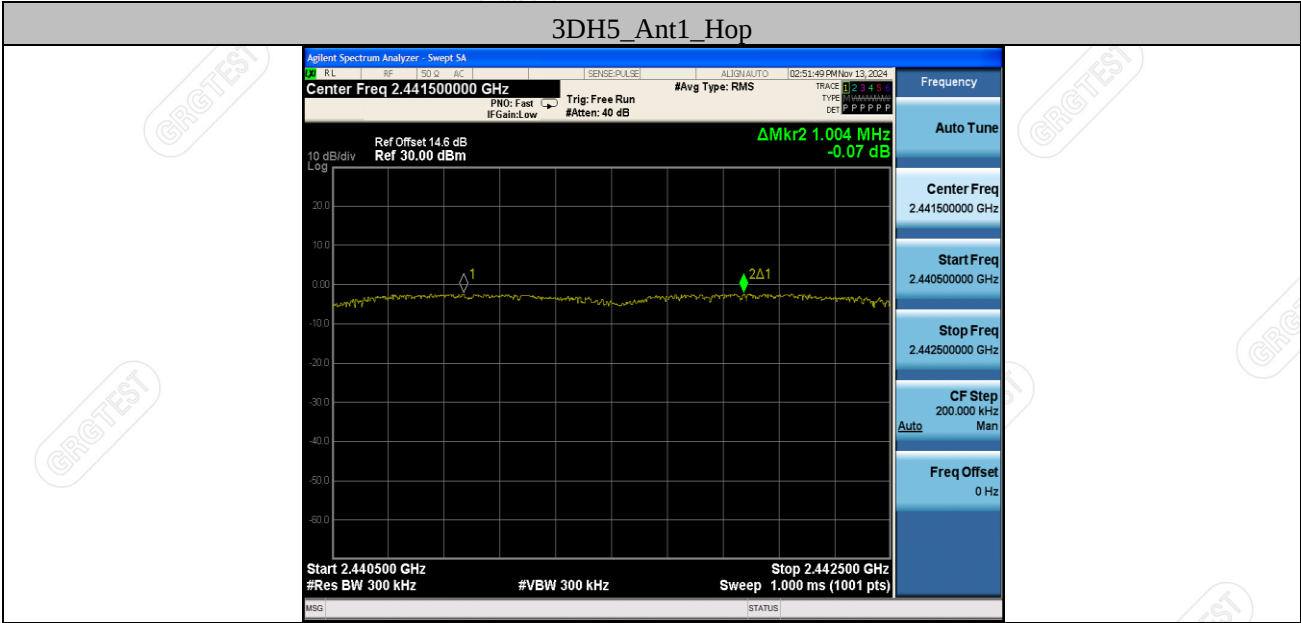
| Test Mode | Antenna | Freq[MHz] | Result[MHz] | Limit[MHz] | Verdict |
|-----------|---------|-----------|-------------|------------|---------|
| DH5       | Ant1    | Hop       | 1.002       | ≥0.664     | PASS    |
| 2DH5      | Ant1    | Hop       | 1.006       | ≥0.912     | PASS    |
| 3DH5      | Ant1    | Hop       | 1.004       | ≥0.904     | PASS    |

NOTE: Limit[MHz]= 20 dB Bandwidth [MHz]\*2/3.

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Test Graphs





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## 9. HOPPING CHANNEL NUMBER

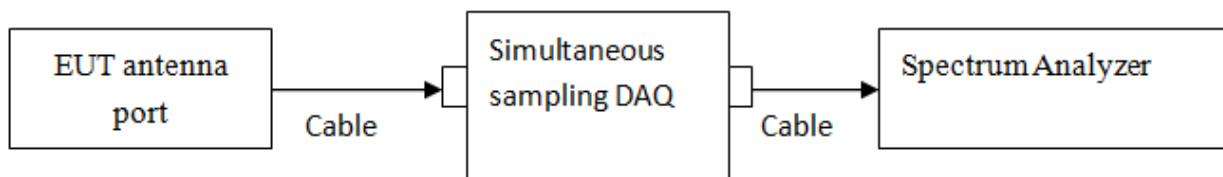
### 9.1 LIMITS

Regulation 15.247 (a) (1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 9.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2) Set the spectrum analyzer as RBW=100kHz, VBW=300kHz.
- 3) Set the spectrum analyzer: start frequency = 2400MHz. stop frequency = 2483.5MHz. Submit the test result graph.

### 9.3 TEST SETUP



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9.4 TEST RESULTS

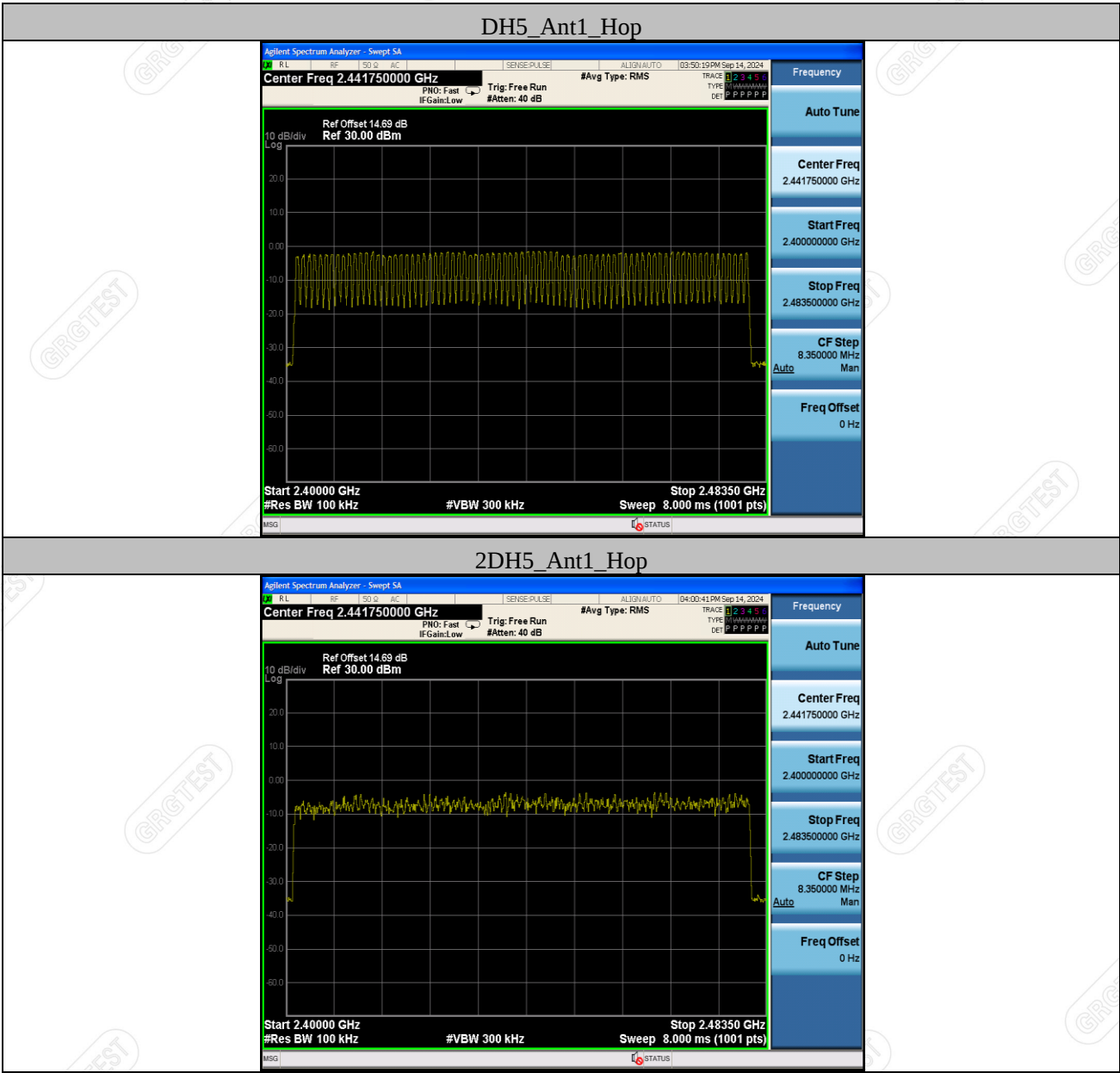
Environment: 24.9°C/49%RH/101.0kPa  
Tested By:Qin Tingting

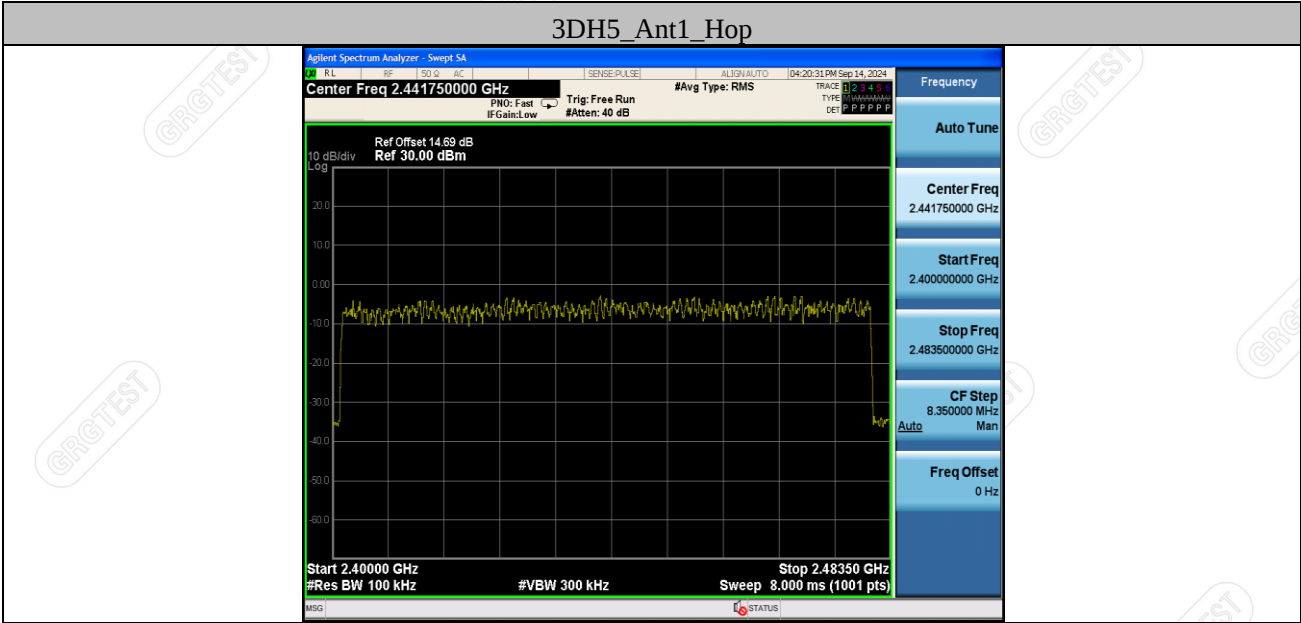
Voltage:DC 13.2V  
Date: 2024-09-14

| Test Mode | Antenna | Freq[MHz] | Result[Num] | Limit[Num] | Verdict |
|-----------|---------|-----------|-------------|------------|---------|
| DH5       | Ant1    | Hop       | 79          | ≥15        | PASS    |
| 2DH5      | Ant1    | Hop       | 79          | ≥15        | PASS    |
| 3DH5      | Ant1    | Hop       | 79          | ≥15        | PASS    |

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Test Graphs





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## 10. DWELL TIME

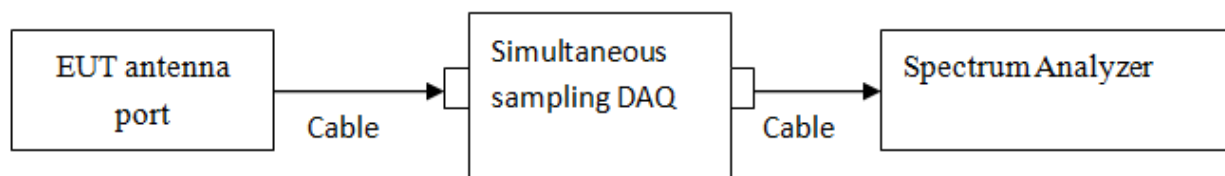
### 10.1 LIMITS

Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 10.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
- 2) Set spectrum analyzer span = 0. centered on a hopping channel;
- 3) Set RBW = 1MHz and VBW = 3MHz. Sweep = as necessary to capture the entire dwell time per hopping channel. Detector Function = Peak. Trace = Clear Write;
- 4) Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.). Repeat this test for each variation.
- 5) DH1 Packet permit maximum  $1600 / 79 / 2 = 10.12$  hops per second in each channel (1 time slot TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $10.12 \times 31.6 = 320$  within 31.6 seconds
- 6) DH3 Packet permit maximum  $1600 / 79 / 4 = 5.06$  hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $5.06 \times 31.6 = 160$  within 31.6 seconds
- 7) DH5 Packet permit maximum  $1600 / 79 / 6 = 3.37$  hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times  $3.37 \times 31.6 = 106.6$  within 31.6 seconds

### 10.3 TEST SETUP



10.4 TEST RESULTS

Environment: 24.9°C/49%RH/101.0kPa  
Tested By:Qin Tingting

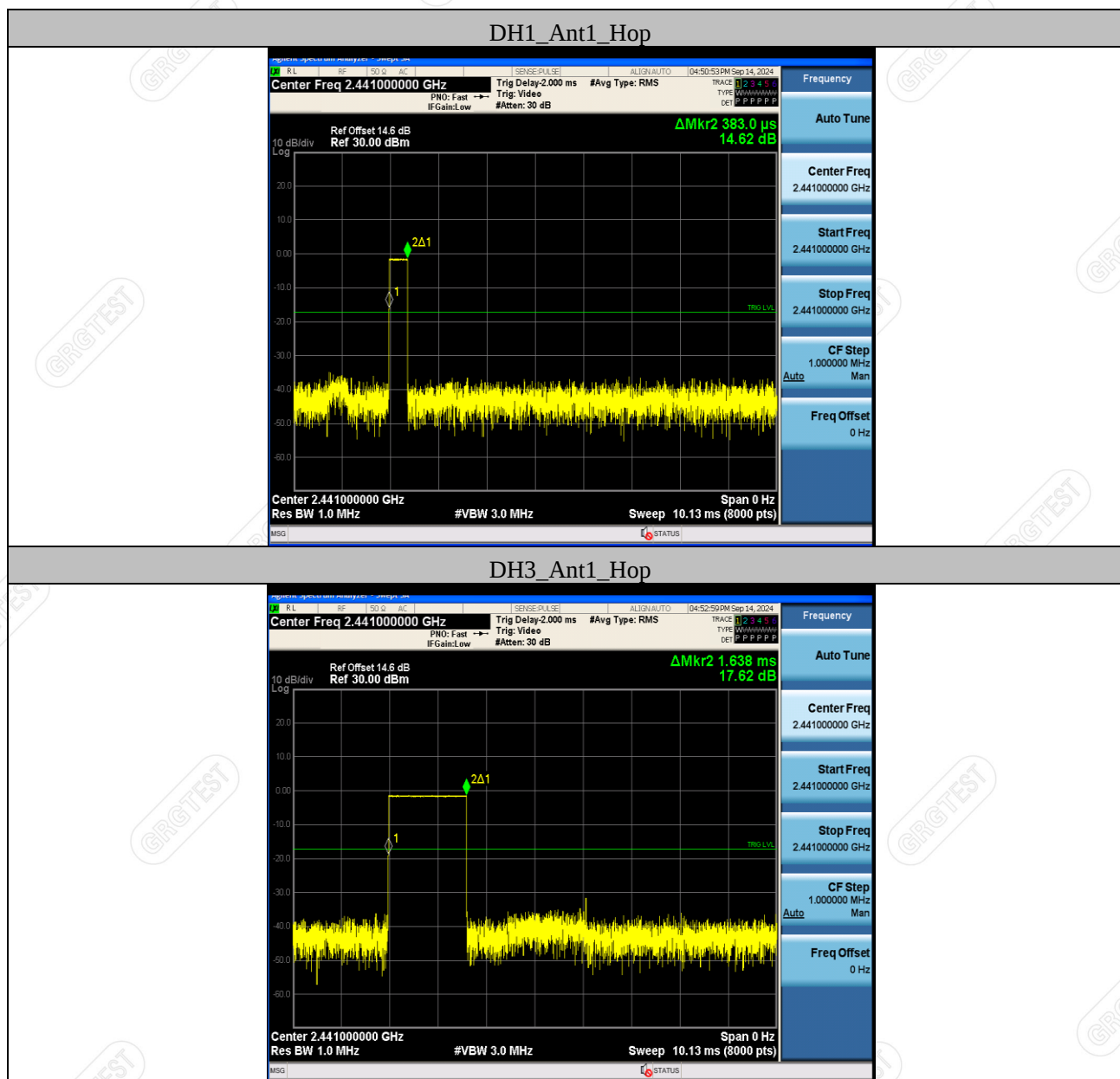
Voltage:DC 13.2V  
Date: 2024-09-14

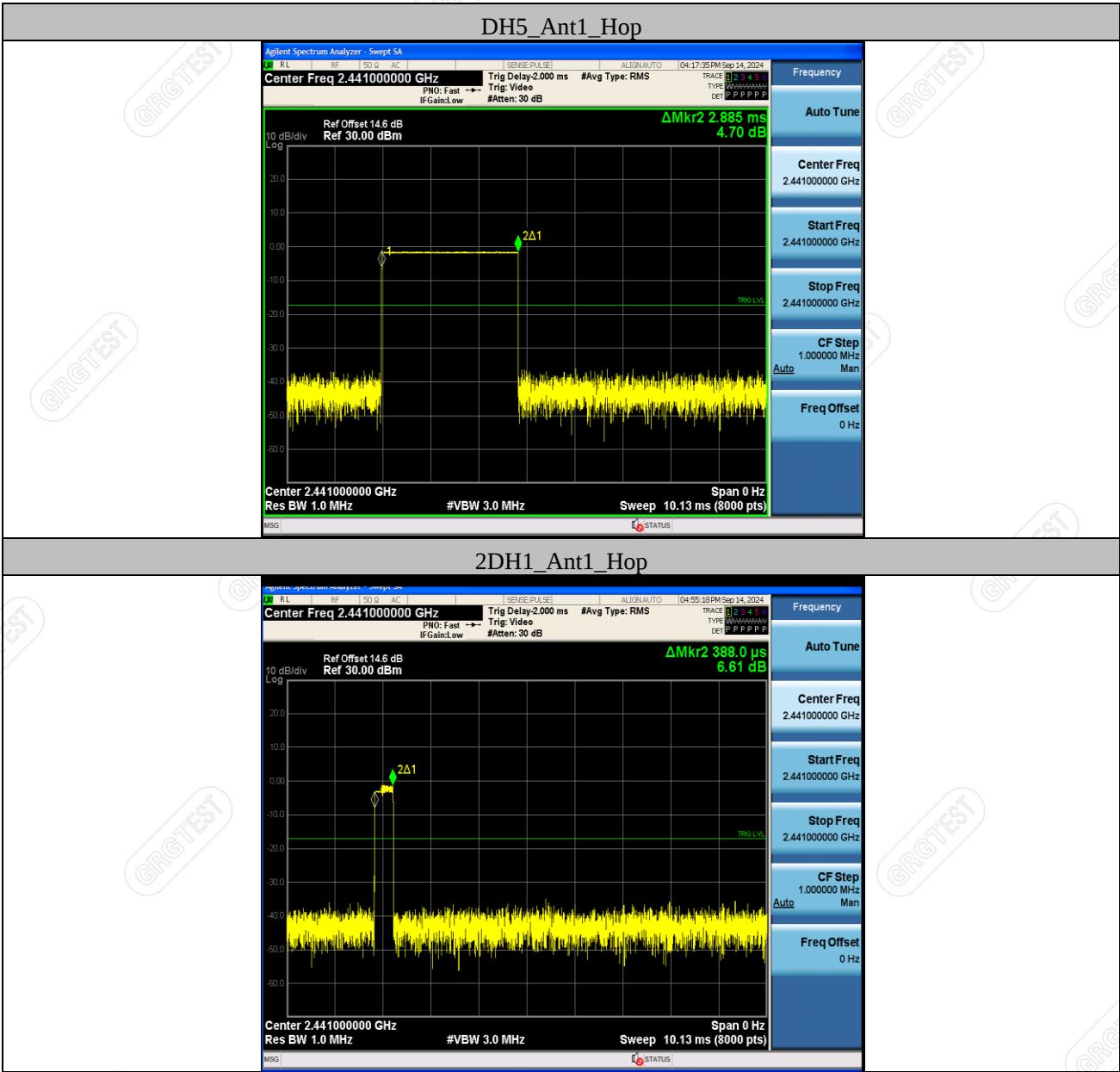
The test period: T= 0.4 Second/Channel x 79 Channel = 31.6 s

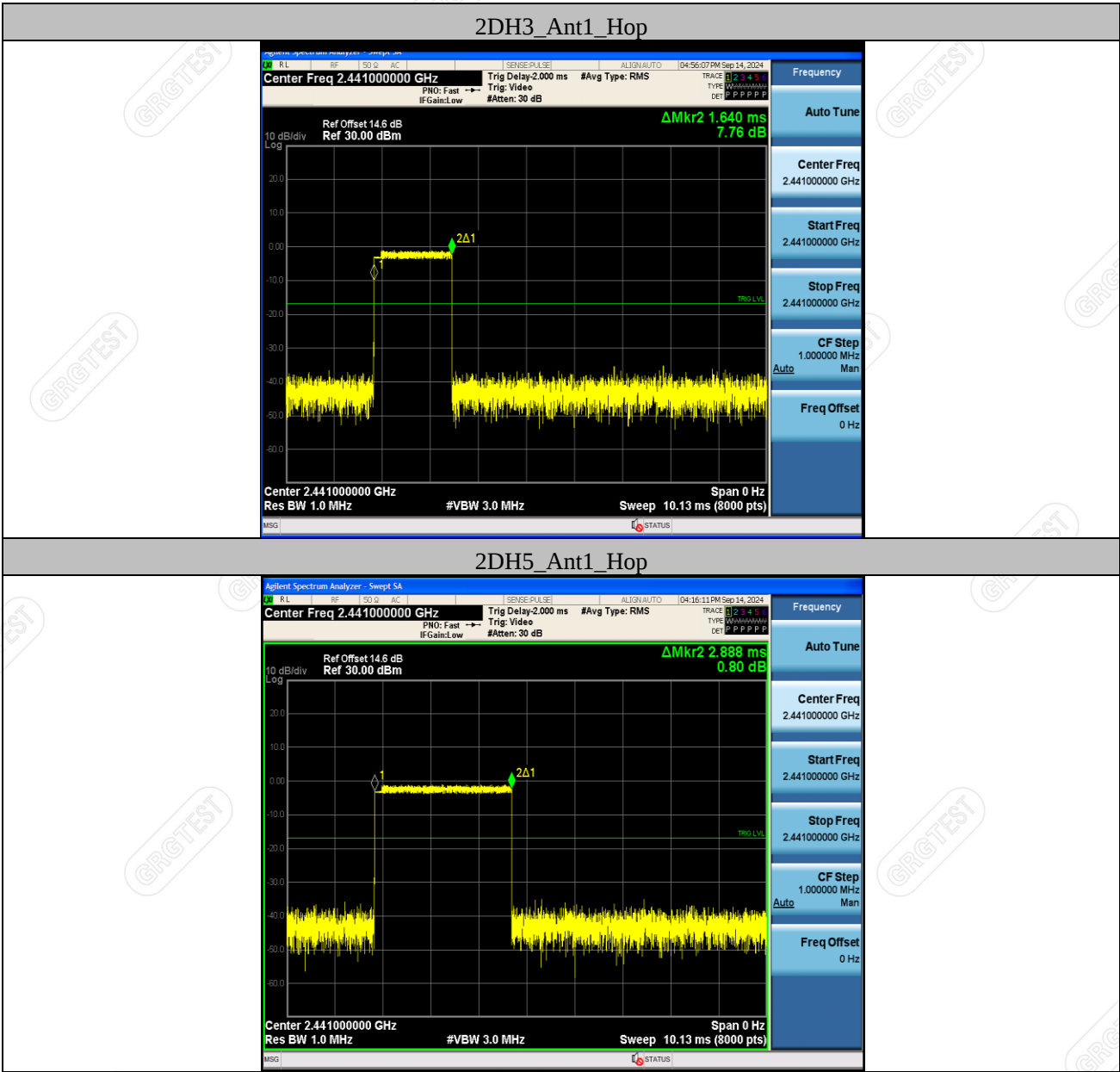
| Test Mode | Antenna | Freq[MHz] | Burst Width<br>[ms] | Total Hops<br>[Num] | Result[s] | Limit[s] | Verdict |
|-----------|---------|-----------|---------------------|---------------------|-----------|----------|---------|
| DH1       | Ant1    | Hop       | 0.383               | 330                 | 0.126     | ≤0.4     | PASS    |
| DH3       | Ant1    | Hop       | 1.638               | 160                 | 0.262     | ≤0.4     | PASS    |
| DH5       | Ant1    | Hop       | 2.885               | 100                 | 0.289     | ≤0.4     | PASS    |
| 2DH1      | Ant1    | Hop       | 0.388               | 330                 | 0.128     | ≤0.4     | PASS    |
| 2DH3      | Ant1    | Hop       | 1.640               | 190                 | 0.312     | ≤0.4     | PASS    |
| 2DH5      | Ant1    | Hop       | 2.888               | 60                  | 0.173     | ≤0.4     | PASS    |
| 3DH1      | Ant1    | Hop       | 0.389               | 330                 | 0.128     | ≤0.4     | PASS    |
| 3DH3      | Ant1    | Hop       | 1.639               | 170                 | 0.279     | ≤0.4     | PASS    |
| 3DH5      | Ant1    | Hop       | 2.889               | 130                 | 0.376     | ≤0.4     | PASS    |

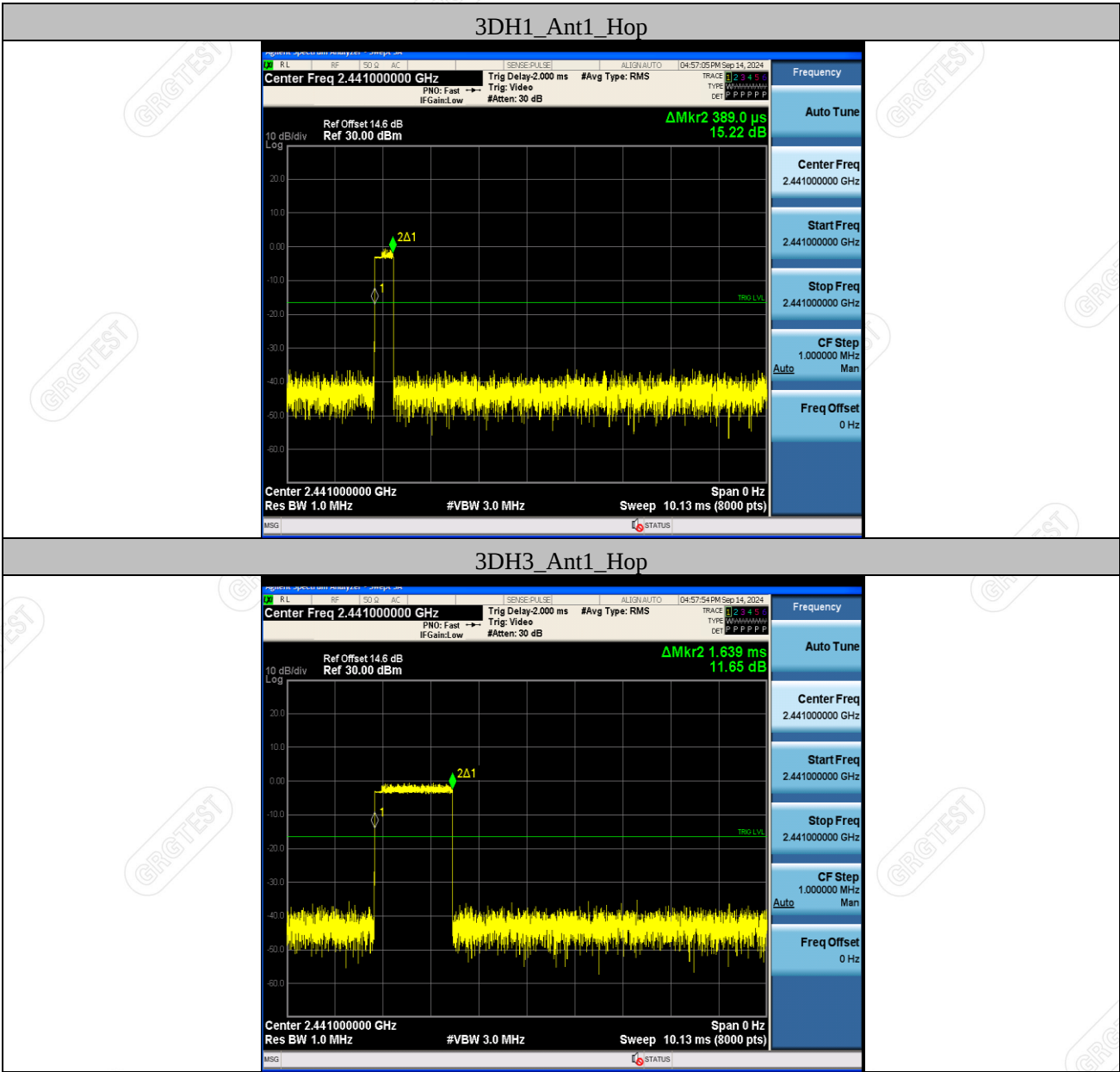
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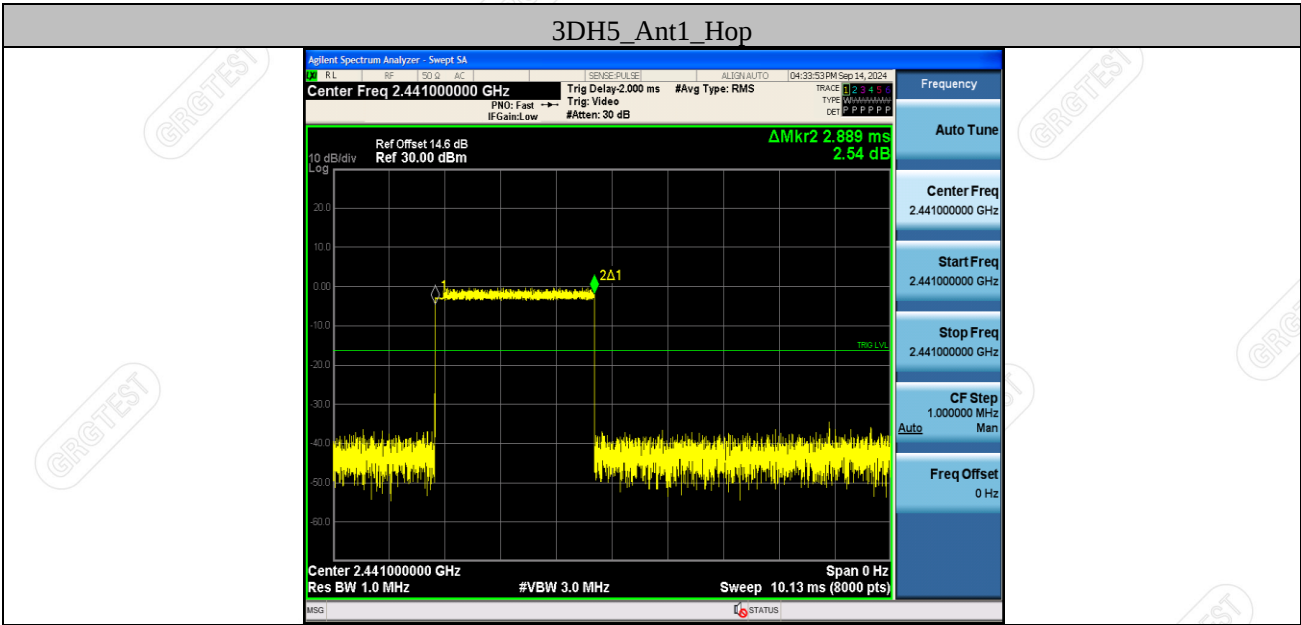
## Test Graphs











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## 11. MAXIMUM PEAK OUTPUT POWER

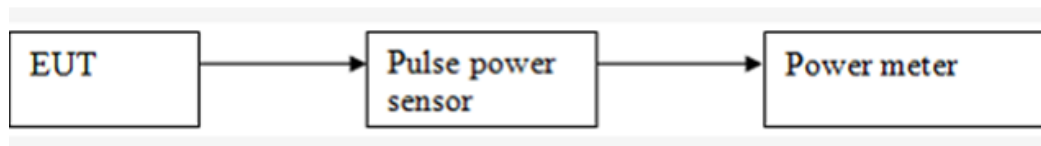
### 11.1 LIMITS

Regulation 15.247 (b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### 11.2 TEST PROCEDURES

- 1) Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the power meter and enable the EUT transmit continuously.
- 2) Keep the EUT in transmitting at lowest, middle and highest channel individually. Record the max value.

### 11.3 TEST SETUP



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11.4 TEST RESULTS

Environment: 24.9°C/49%RH/101.0kPa  
Tested By:Qin Tingting

Voltage:DC 13.2V  
Date: 2024-09-14

DH5

| Test Channel | Fundamental Frequency (GHz) | Max Output Power(dBm) | Limit (dBm) | Peak/ Average | Pass/Fail |
|--------------|-----------------------------|-----------------------|-------------|---------------|-----------|
| Lowest       | 2.402                       | -1.89                 | 20.97       | Peak          | Pass      |
| Middle       | 2.441                       | -1.78                 |             |               | Pass      |
| Highest      | 2.480                       | -2.01                 |             |               | Pass      |

2DH5

| Test Channel | Fundamental Frequency (GHz) | Max Output Power(dBm) | Limit (dBm) | Peak/ Average | Pass/Fail |
|--------------|-----------------------------|-----------------------|-------------|---------------|-----------|
| Lowest       | 2.402                       | -1.20                 | 20.97       | Peak          | Pass      |
| Middle       | 2.441                       | -0.67                 |             |               | Pass      |
| Highest      | 2.480                       | -0.81                 |             |               | Pass      |

3DH5

| Test Channel | Fundamental Frequency (GHz) | Max Output Power(dBm) | Limit (dBm) | Peak/ Average | Pass/Fail |
|--------------|-----------------------------|-----------------------|-------------|---------------|-----------|
| Lowest       | 2.402                       | -0.98                 | 20.97       | Peak          | Pass      |
| Middle       | 2.441                       | -0.53                 |             |               | Pass      |
| Highest      | 2.480                       | -0.67                 |             |               | Pass      |

## 12. CONDUCTED BAND EDGES AND SPURIOUS EMISSIONS

### 12.1 LIMITS

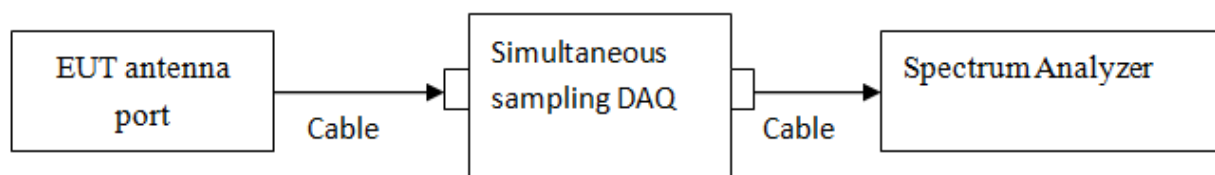
In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.

### 12.2 TEST PROCEDURES

Test procedures follow KDB 558074 D01 DTS Measurement Guidance v05r02.

- 1) Remove the antenna from the EUT and then connect a low attenuation cable from the antenna port to the spectrum.
- 2) Set the spectrum analyzer: RBW =100kHz; VBW =300kHz, Frequency range = 30MHz to 26.5GHz; Sweep = auto; Detector Function = Peak. Trace = Max, hold.
- 3) Measure and record the results in the test report.
- 4) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

### 12.3 TEST SETUP



12.4 TEST RESULTS

Environment: 24.9°C/49%RH/101.0kPa  
Tested By:Qin Tingting

Voltage:DC 13.2V  
Date: 2024-09-14

Band Edge

| Test Mode | Antenna | Ch Name | Freq[MHz] | Ref Level [dBm] | Result [dBm] | Limit [dBm] | Verdict |
|-----------|---------|---------|-----------|-----------------|--------------|-------------|---------|
| DH5       | Ant1    | Low     | 2402      | -2.62           | -43.41       | ≤-22.62     | PASS    |
|           |         | High    | 2480      | -1.65           | -43.08       | ≤-21.65     | PASS    |
|           |         | Low     | Hop_2402  | -3.60           | -43.58       | ≤-23.60     | PASS    |
|           |         | High    | Hop_2480  | -1.90           | -43.18       | ≤-21.90     | PASS    |
| 2DH5      | Ant1    | Low     | 2402      | -5.39           | -43.78       | ≤-25.39     | PASS    |
|           |         | High    | 2480      | -3.53           | -42.73       | ≤-23.53     | PASS    |
|           |         | Low     | Hop_2402  | -8.13           | -44.06       | ≤-28.13     | PASS    |
|           |         | High    | Hop_2480  | -3.51           | -42.25       | ≤-23.51     | PASS    |
| 3DH5      | Ant1    | Low     | 2402      | -4.69           | -43.70       | ≤-24.69     | PASS    |
|           |         | High    | 2480      | -4.07           | -42.84       | ≤-24.07     | PASS    |
|           |         | Low     | Hop_2402  | -6.43           | -44.23       | ≤-26.43     | PASS    |
|           |         | High    | Hop_2480  | -4.93           | -42.61       | ≤-24.93     | PASS    |

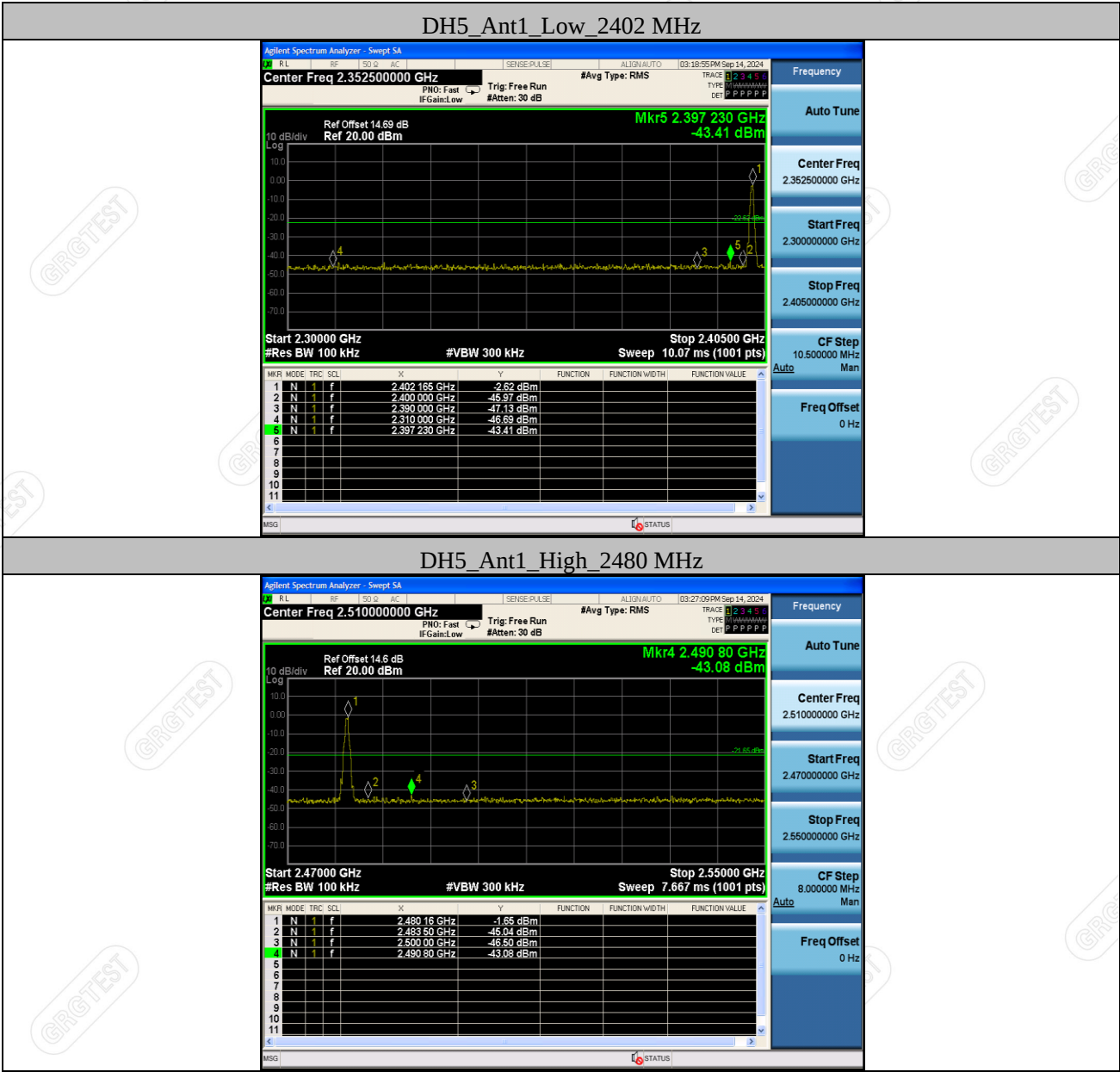
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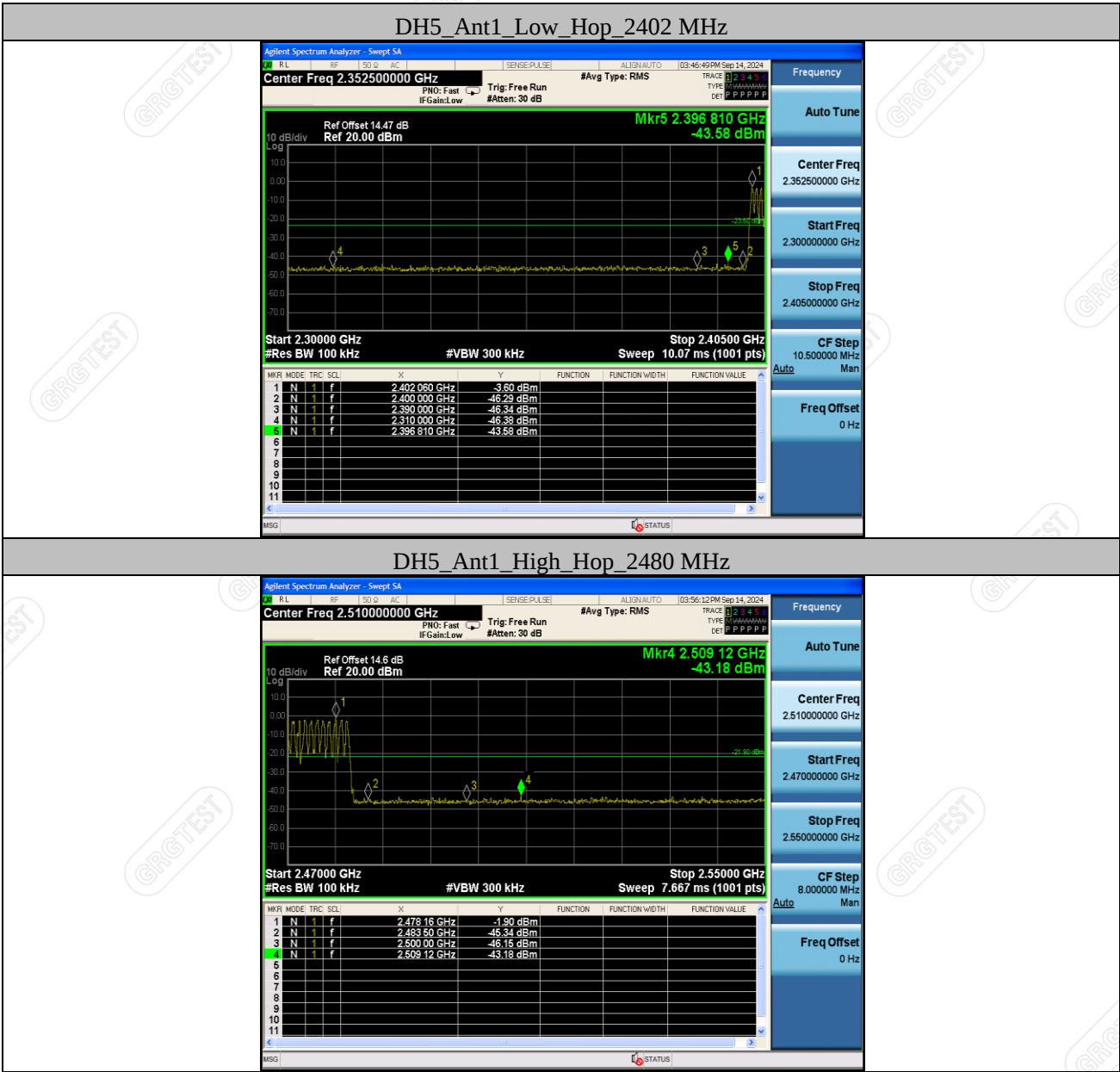
**Conducted Spurious Emission**

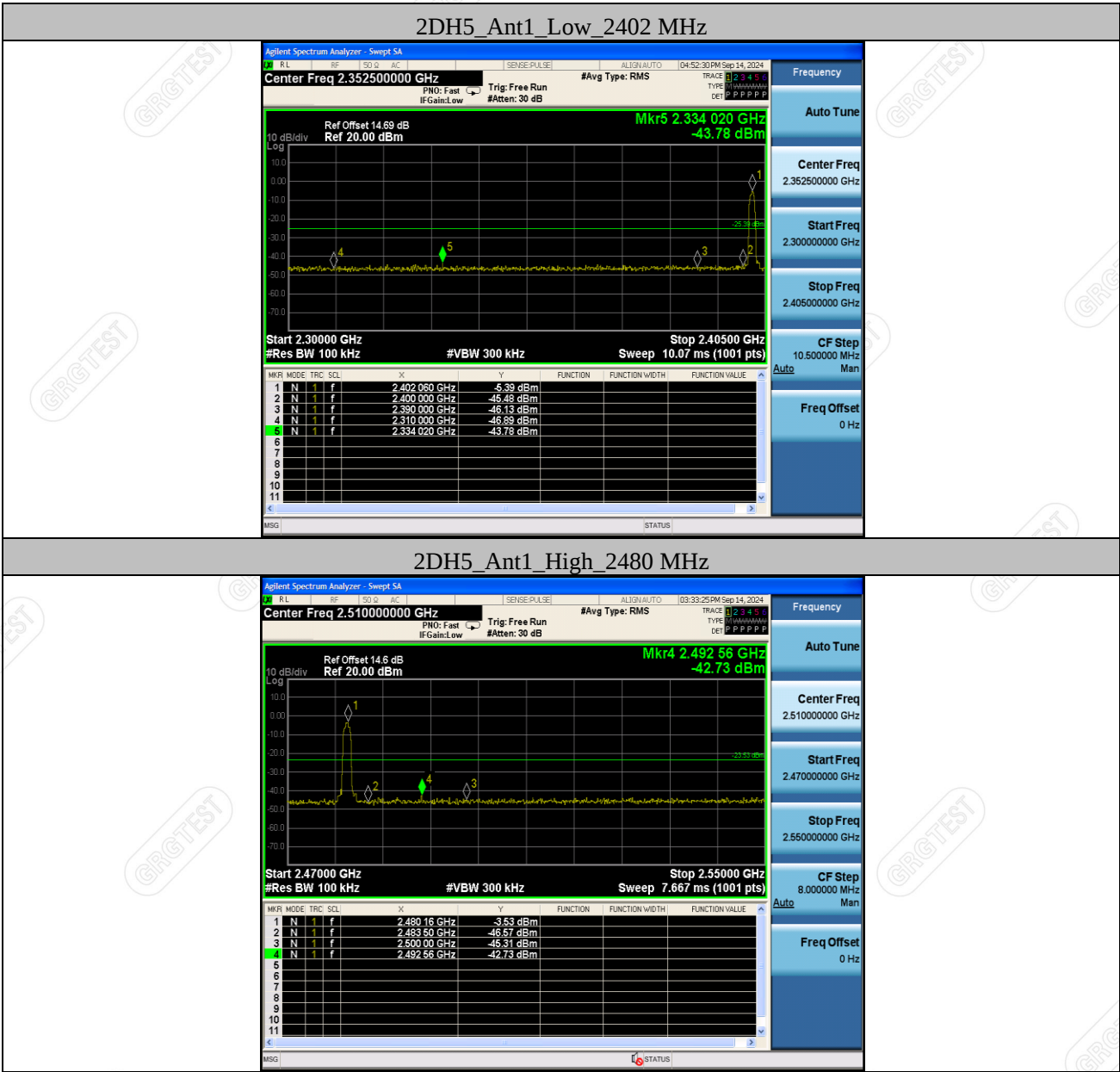
| Test Mode | Antenna | Freq[MHz] | Freq Range [MHz] | Ref Level [dBm] | Result [dBm] | Limit [dBm]   | Verdict |
|-----------|---------|-----------|------------------|-----------------|--------------|---------------|---------|
| DH5       | Ant1    | 2402      | Reference        | -3.14           | -3.14        | ---           | PASS    |
|           |         |           | 30~1000          | -3.14           | -55.17       | $\leq -23.14$ | PASS    |
|           |         |           | 1000~26500       | -3.14           | -31.26       | $\leq -23.14$ | PASS    |
|           |         | 2441      | Reference        | -1.47           | -1.47        | ---           | PASS    |
|           |         |           | 30~1000          | -1.47           | -55.35       | $\leq -21.47$ | PASS    |
|           |         |           | 1000~26500       | -1.47           | -30.99       | $\leq -21.47$ | PASS    |
|           |         | 2480      | Reference        | -1.85           | -1.85        | ---           | PASS    |
|           |         |           | 30~1000          | -1.85           | -55.97       | $\leq -21.85$ | PASS    |
|           |         |           | 1000~26500       | -1.85           | -31.03       | $\leq -21.85$ | PASS    |
| 2DH5      | Ant1    | 2402      | Reference        | -4.74           | -4.74        | ---           | PASS    |
|           |         |           | 30~1000          | -4.74           | -55.75       | $\leq -24.74$ | PASS    |
|           |         |           | 1000~26500       | -4.74           | -31.5        | $\leq -24.74$ | PASS    |
|           |         | 2441      | Reference        | -3.18           | -3.18        | ---           | PASS    |
|           |         |           | 30~1000          | -3.18           | -56.24       | $\leq -23.18$ | PASS    |
|           |         |           | 1000~26500       | -3.18           | -31.87       | $\leq -23.18$ | PASS    |
|           |         | 2480      | Reference        | -3.50           | -3.50        | ---           | PASS    |
|           |         |           | 30~1000          | -3.50           | -55.06       | $\leq -23.5$  | PASS    |
|           |         |           | 1000~26500       | -3.50           | -31.66       | $\leq -23.5$  | PASS    |
| 3DH5      | Ant1    | 2402      | Reference        | -4.61           | -4.61        | ---           | PASS    |
|           |         |           | 30~1000          | -4.61           | -55.15       | $\leq -24.61$ | PASS    |
|           |         |           | 1000~26500       | -4.61           | -30.93       | $\leq -24.61$ | PASS    |
|           |         | 2441      | Reference        | -3.14           | -3.14        | ---           | PASS    |
|           |         |           | 30~1000          | -3.14           | -55.36       | $\leq -23.14$ | PASS    |
|           |         |           | 1000~26500       | -3.14           | -31.44       | $\leq -23.14$ | PASS    |
|           |         | 2480      | Reference        | -3.30           | -3.30        | ---           | PASS    |
|           |         |           | 30~1000          | -3.30           | -54.93       | $\leq -23.3$  | PASS    |
|           |         |           | 1000~26500       | -3.30           | -31.88       | $\leq -23.3$  | PASS    |

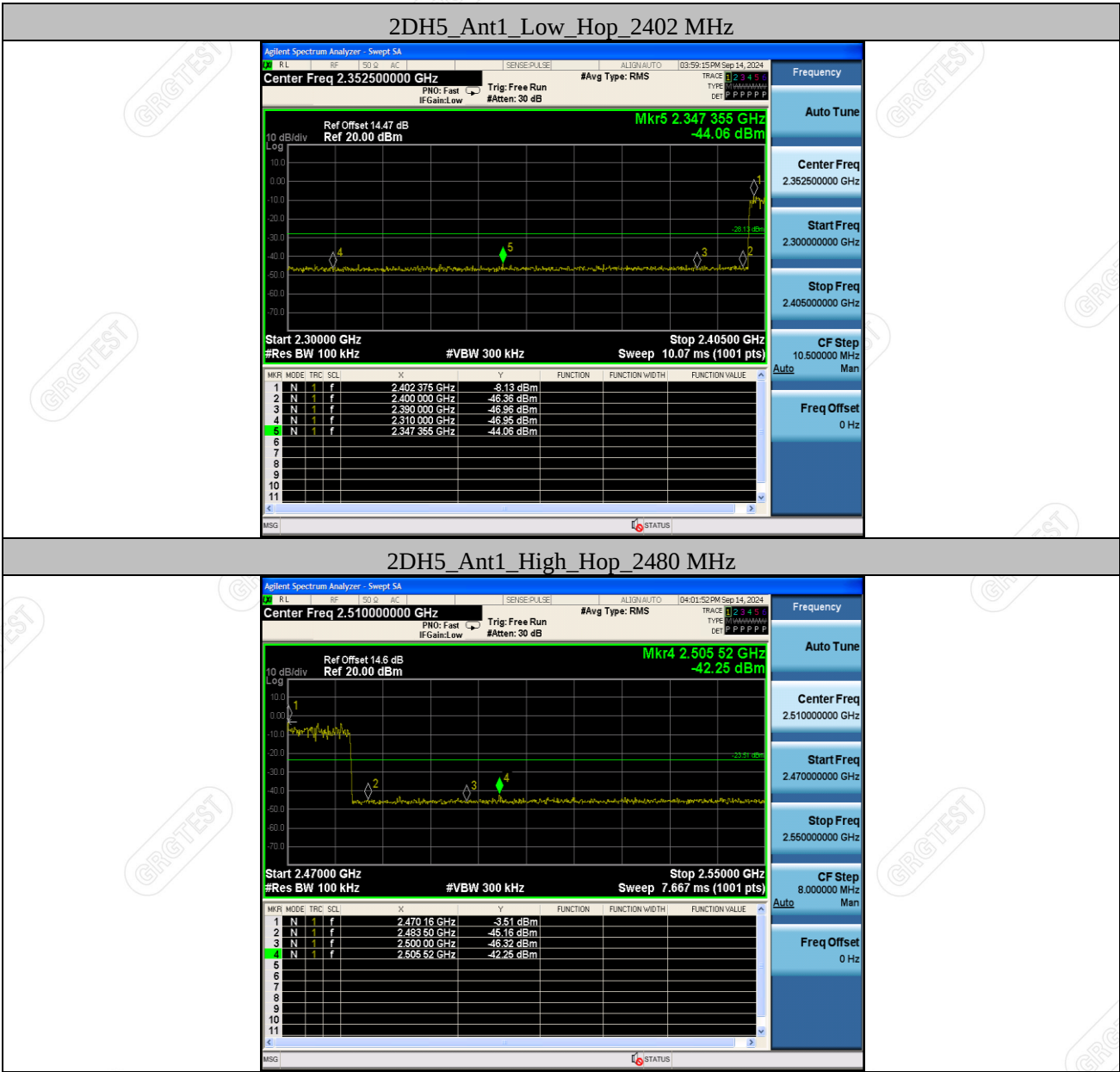
Test Graphs

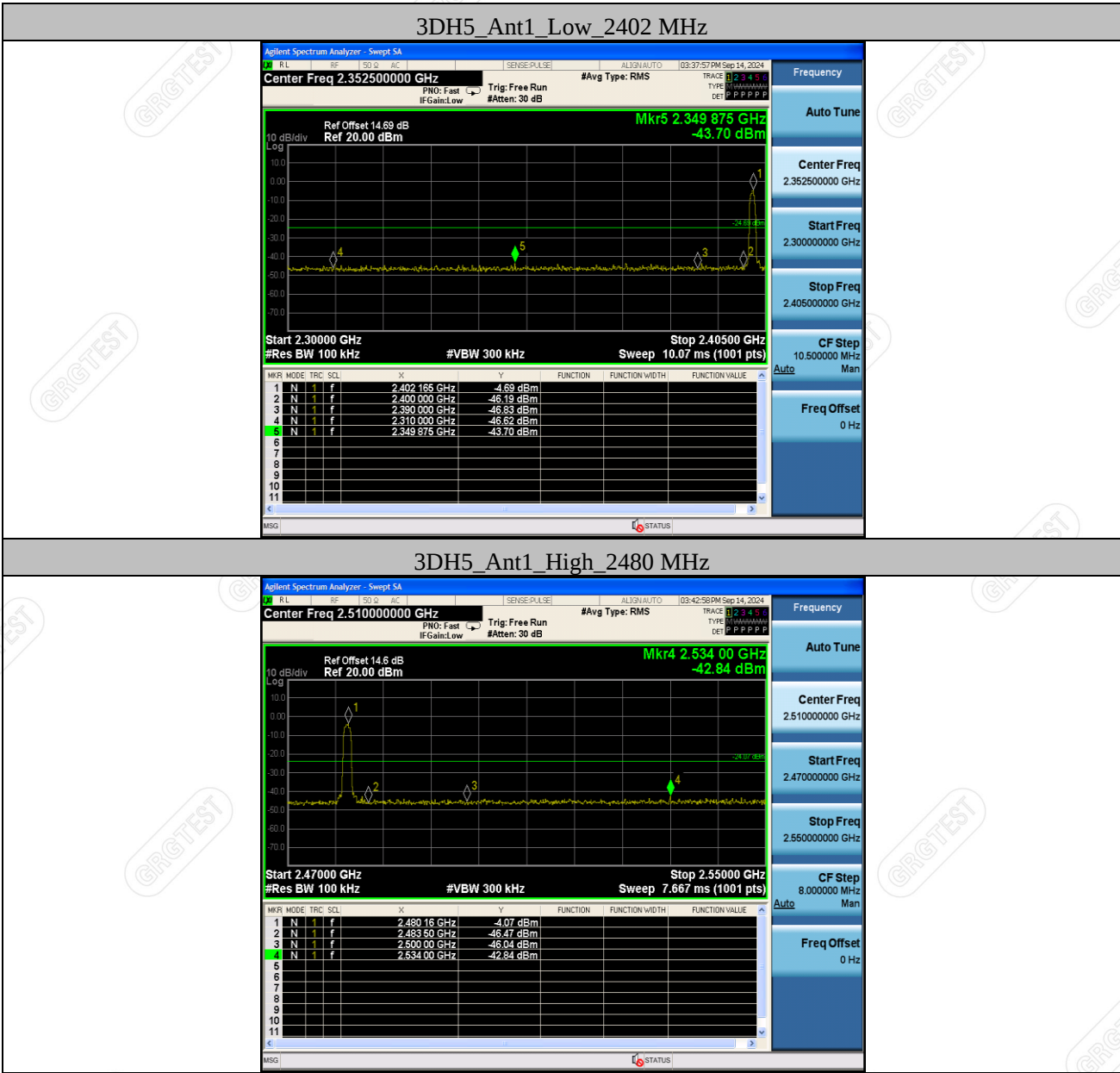
Band Edge

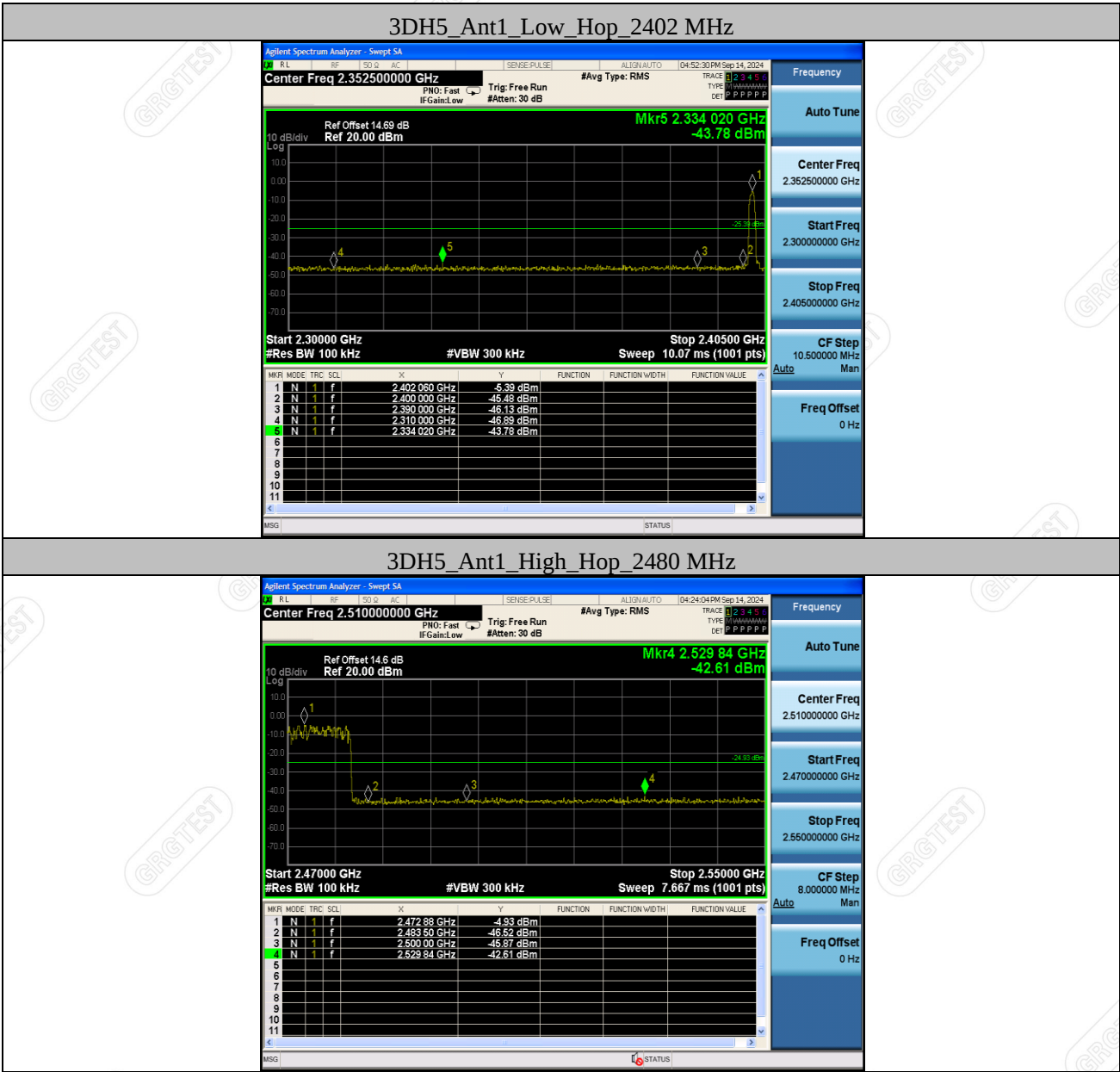




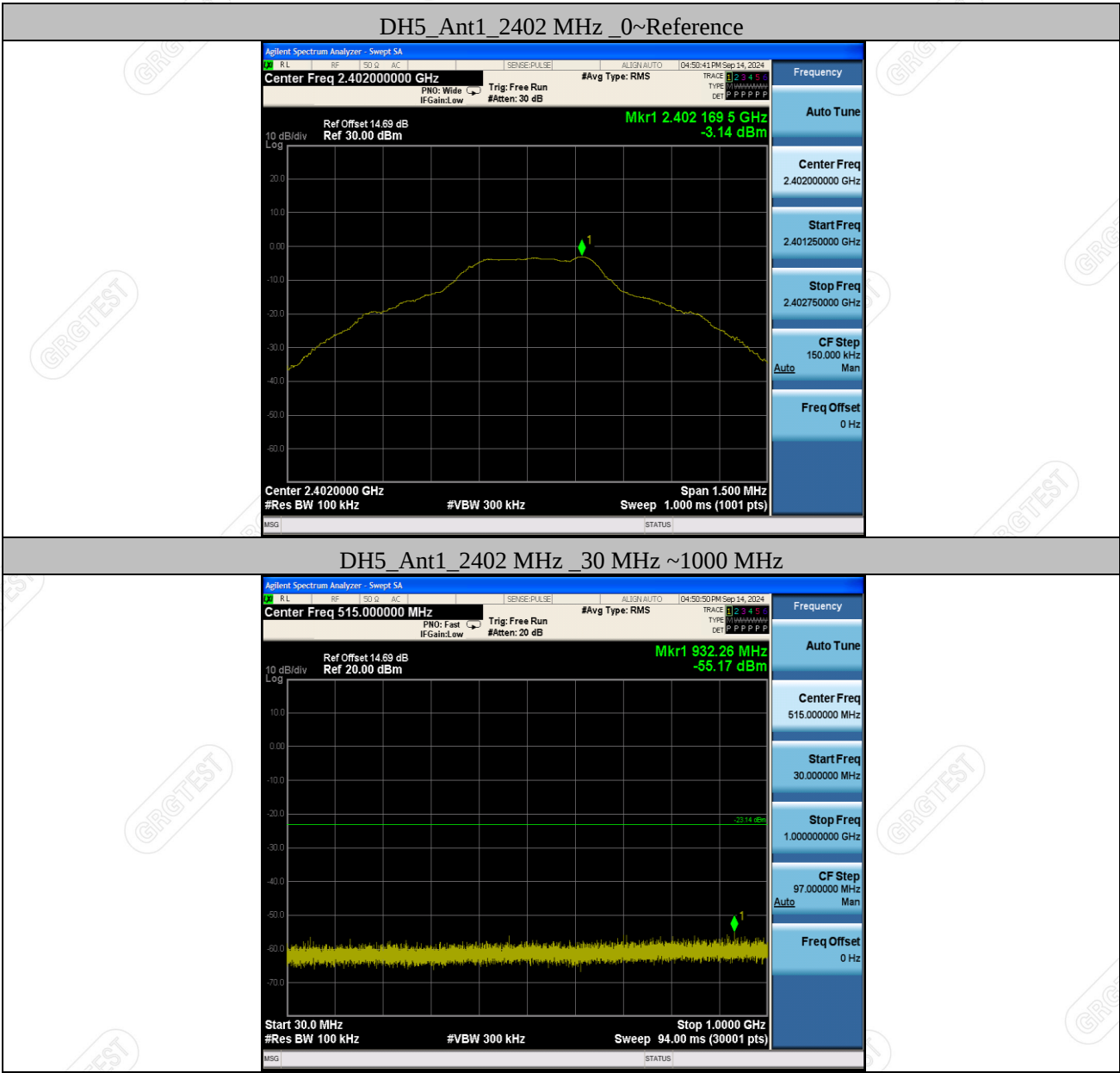








Conducted Spurious Emission



DH5\_Ant1\_2402 MHz\_30 MHz ~1000 MHz

Agilent Spectrum Analyzer - Swept SA

RL

SENSE: PULSE

ALIGN: AUTO

04:50:50 PM Sep 14, 2024

TRAC 1 2 3 4 5 6

TYPE 1 2 3 4 5 6

DET 1 2 3 4 5 6

Center Freq 515.000000 MHz

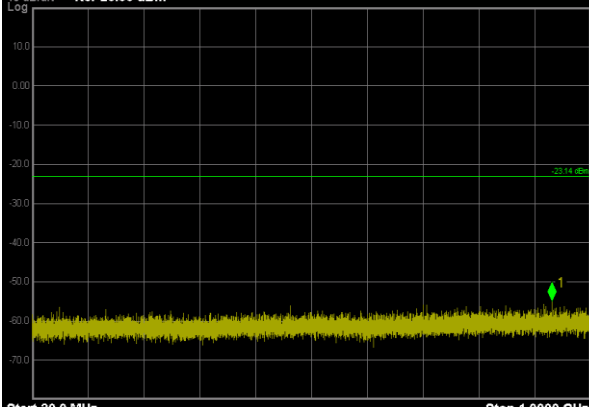
PNO: Fast IF Gain: Low

Trig: Free Run #Atten: 20 dB

#Avg Type: RMS

Ref Offset 14.69 dB  
Ref 20.00 dBmMkr1 932.26 MHz  
-55.17 dBm

10 dB/div  
Log



Start 30.0 MHz  
#Res BW 100 kHz #VBW 300 kHz Sweep 94.00 ms (30001 pts)

Frequency

Auto Tune

Center Freq  
515.000000 MHz

Start Freq  
30.000000 MHz

Stop Freq  
1.000000000 GHz

CF Step  
97.000000 MHz  
Auto Man

Freq Offset  
0 Hz

MSG STATUS

